Lesson 3

3.1 Example #1

Solve the equation, $9^{5x-3} = 27^{x+5}$

[3 marks]

3.2 Example #2

The equation $x^2 + 3mx + (4m + 1) = 0$, where m is a constant, has equal roots.

(i)   Find the possible values of m

[4 marks]

(ii)   For these values of m, solve the equation

$$x^2 + 3mx + (4m + 1) = 0$$

[4 marks]

3.3 Revision Exercise

Any solution based entirely on graphical
or numerical methods is not acceptable
Marks Available : 52

Question 1

Solve the equation, $8^{7x-6} = 16^{8-x}$

[3 marks]

Question 2

The equation $x^2 + 2mx + (3m + 4) = 0$, where m is a constant, has equal roots.

(**i**)   Find the possible values of m

[4 marks]

(**ii**)   For these values of m, solve the equation

$$x^2 + 2mx + (3m + 4) = 0$$

[4 marks]

Question 3

Simplify the following algebraic expressions by first factorising the quadratics:

$$\frac{x^2 + 2x - 24}{x^2 - 3x - 54}$$

[2 marks]

Question 4

Solve simultaneously,

$$5x^2 - 4xy + y^2 = 13$$

$$y = x + 1$$

[5 marks]

Question 5

$$m(x) = x^3 + 13x^2 + ax + 63$$

(i)   Given that $x + 7$ is a factor of $m(x)$ determine the integer value of a

[2 marks]

(ii)   Hence, factorise $m(x)$ completely.

[4 marks]

Question 6

Determine the coordinates of the centre and the radius of the circle with equation,

$$x^2 + y^2 + 96x - 110y = 0$$

[4 marks]

Question 7

Determine the value of a

$$\frac{\sqrt{3}}{81} = 3^a$$

[3 marks]

Question 8

A circle, C, has equation,

$$(x - 3)^2 + (y - 15)^2 = 17^2$$

(i)   Write down the coordinates of the point X, the centre of the circle.

[2 marks]

(ii)   What is the diameter of the circle ?

[1 mark]

(iii)   Give the coordinates of the points M and N, where the circle crosses the x-axis.

[3 marks]

(iv)   What is the perimeter of triangle MXN ?

[2 marks]

Question 9

It is wished to solve the inequality,

$$\frac{5}{x-3} < 2 \qquad x \neq 3$$

(i) Explain the reason for the restriction, $x \neq 3$

[**1 mark**]

(ii) Explain why this inequality can not be solved by multiplying both sides by $(x-3)$

[**1 mark**]

(iii) Solve the inequality by first multiplying both sides by $(x-3)^2$

[**3 marks**]

(iv) Explain why it was OK to multiply both sides by $(x-3)^2$

[**1 mark**]

Question 10

The following equation, where k is a constant, has no real roots

$$k\,x^2 - 2kx + 3 = 0$$

Prove that k satisfies the inequality, $0 \leqslant k < 3$

[4 marks]

Question 11

AS-Level Examination Question, May 2018, Q4 (Edexcel)

The line L_1 has equation $4y - 3x = 10$

The line L_2 passes through the points $(5, -1)$ and $(-1, 8)$

Determine, giving full reasons for your answer, whether lines L_1 and L_2 are parallel, perpendicular or neither.

[3 marks]